PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-004421

(43)Date of publication of application : 07.01.2000

---

(51)Int.Cl. H04N 5/91

G11B 27/00

H04N 5/765

H04N 5/781

H04N 5/92

---

(21)Application number : 10-169491 (71)Applicant : HITACHI LTD

MATSUSHITA ELECTRIC IND CO LTD

(22)Date of filing : 17.06.1998 (72)Inventor : KAGEYAMA MASAHIRO

DATE SATORU

ITO TAMOTSU

MURASE KAORU

OKADA TOMOYUKI

---

(54) OPTICAL DISK, OPTICAL DISK RECORDER AND OPTICAL DISK PLAYER

(57)Abstract:

PROBLEM TO BE SOLVED: To compress the managing information of still pictures and sounds into the minimum size by providing still picture book managing information (VOBSI) and a still picture managing information table (video table) in the variable length size proportional to the number of the still pictures.

SOLUTION: This device is provided with VOBSI for managing plural pieces of still picture data as one of a still picture book and a video table in the variable

length size proportional to the number of the still pictures to be managed by the VOBSI. Concerning managing information for the still picture, VOBS information (VOBSI) is stored in a VOBI table in place of the VOBI. Further, the video table stores still picture managing information (video I) for every one sheet of the still picture and still picture managing information number (number-off video Is) and that video I has the size information (size) 1B of the still picture data and printer information (Ptr-to-audio) 1B to audio managing information in the audio managing information table (audio table) as the information of sounds to be reproduced simultaneously with the still pictures.

LEGAL STATUS [Date of request for examination] 20.12.2001

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3356991

[Date of registration] 04.10.2002

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

CLAIMS

[Claim(s)]

[Claim 1] The optical disk characterized by having the still picture management information table (Video_Table) of the variable-length size proportional to the still

picture number of sheets managed by the quiescence book-of-paintings management information (VOBSI) which is the optical disk with which still picture data were recorded at least, and manages the still picture data of two or more sheets as one quiescence book of paintings, and said quiescence book-of-paintings management information (VOBSI).

[Claim 2] The optical disk characterized by having the voice management information table (Audio_Table) of the variable-length size which is an optical disk according to claim 1, and is proportional to the number of voice by which synchronous playback is carried out at the still picture in said quiescence book of paintings when the voice reproduced synchronizing with said still picture is recorded.

[Claim 3] It is the optical disk characterized by being an optical disk claim 1 thru/or given in two, and for said still picture management information table (Video_Table) having still picture management information (VideoI), and having the pointer information (Ptr_to_AudioI) to still picture data size and the voice management information (AudioI) by which synchronous playback is carried out with the still picture concerned in said still picture management information (VideoI).

[Claim 4] It is the optical disk characterized by being an optical disk claim 1 thru/or given in three, and for said voice management information table

(Audio_Table) having voice management information (AudioI), and having the address of voice data, voice data size, voice playback time amount, and the pointer information (Ptr_to_AudioI) that stretches the link to other voice management information (AudioI) at the time of postrecording use in said voice management information (AudioI).

[Claim 5] The optical disk characterized by having the playback discernment flag (Playback_permission) which is an optical disk claim 1 thru/or given in four, and shows the existence of the display at the time of playback for every still picture in said quiescence book of paintings in said still picture management information (VideoI).

[Claim 6] The optical disk recorder characterized by carrying out additional record at said still picture management information table (Video_Table) of the variable-length size which creates the still picture management information (VideoI) which is the optical disk recorder which records still picture data on an optical disk claim 1 thru/or given in five at least, and manages said still picture at the time of still picture record, and is proportional to the still picture number of sheets in said quiescence book of paintings.

[Claim 7] When it is an optical disk recorder according to claim 6 and the voice by which synchronous playback is carried out is recorded to said still picture The voice management information (AudioI) which manages said voice data is

created. Additional record is carried out at said voice management information table (Audio_Table) of the variable-length size which is proportional to the still picture in said quiescence book of paintings at the number of voice by which synchronous playback is carried out. The optical disk recorder characterized by recording the pointer information (Ptr_to_AudioI) to the voice management information (AudioI) in the still picture management information (VideoI) which manages said still picture as the voice management information (AudioI) concerned.

[Claim 8] When it postrecords to the still picture which has the voice by which is claim 6 thru/or an optical disk recorder given in seven, and synchronous playback is carried out Create the recorded voice management information (AudioI) for voice, and additional record is carried out at said voice management information table (Audio_Table). The optical disk recorder characterized by what is recorded on the pointer information (Ptr_to_AudioI) to other voice management information (AudioI) in the voice management information (AudioI) for said original voice as pointing to the voice management information (AudioI) concerned.

[Claim 9] The optical disk recorder which are claim 6 thru/or an optical disk recorder given in eight, and is characterized by setting up a playback discernment flag (Playback_Permission) improper to the still picture which is not

reproduced within said quiescence book of paintings.

[Claim 10] It is the optical disk player which plays an optical disk claim 1 thru/or given in five. Still picture playback is performed in order of the still picture management information table (Video_Table) in said quiescence book-of-paintings management information (VOBSI). When effective value is described by the pointer information (Ptr_to_AudioI) to the voice management information (AudioI) in said still picture management information (VideoI) at the time of still picture playback As long as it searches the voice management information (AudioI) concerned and the link to the voice management information (AuidoI) of further others is stretched, new voice management information (AudioI) is searched. The optical disk player characterized by determining the voice which carries out synchronous playback as said still picture, and performing playback of a still picture and voice.

[Claim 11] It is the optical disk player which searches the playback discernment flag (Playback_Permission) in the still picture management information (VideoI) which is an optical disk player according to claim 10, and manages the still picture to reproduce, and is characterized by not reproducing said still picture in the case of a playback improper condition.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the optical disk which can be written, and the record approach and the playback approach. It is related with the optical disk with which the multimedia data which contain dynamic-image data, still picture data, and audio data especially were recorded, and the record approach and the playback approach.

[0002]

[Description of the Prior Art] Phase change mold disk DVD-RAM which has the capacity of several GB in the field of the erasable optical disk whose about 650MB was an upper limit appeared. Moreover, the utilization and the interval of MPEG (MPEG 2) which are the coding specification of digital AV data are expected for DVD-RAM as record / playback media not only in a computer application but AV. That is, spread is predicted as media replaced with the magnetic tape which is the conventional typical AV archive medium.

[0003] (Explanation of DVD-RAM) The densification of a rewritable optical disk progresses, and it does not stop at record of computer data or audio data, but is becoming recordable [image data] in recent years. For example, the guide slot on uneven is formed in the signal recording surface of an optical disk from the former.

[0004] Although the signal was conventionally recorded only on a convex or concave, it became possible to record a signal on both unevenness by the land group recording method. Thereby, twice [about] as many improvement in recording density as this was realized (for example, refer to JP,8-7282,A).

[0005] Moreover, in order to raise recording density, zone CLV which simplifies control of effective CLV (constant linear velocity record), and makes utilization easy is devised and put in practical use (for example, JP,7-93873,A).

[0006] It is a future big technical problem how the engine performance which records AV data containing image data and exceeds the conventional AV equipment greatly, and a new function are realized using the optical disk which aims at these large capacity-ization.

[0007] Record and playback of AV can also consider that an optical disk serves as a subject instead of the conventional tape with the advent of an optical disk rewritable [with such large capacity]. The shift of an archive medium to a disk from a tape has various effects in respect of the function and engine

performance of an AV equipment.

[0008] The greatest description in the shift to a disk is large improvement in the random access engine performance. When carrying out random access of the tape temporarily, the time amount of several minute order is usually required for rewinding [of one roll]. This is extraordinarily late compared with the seek time (several 10 or less ms) in optical disk media. Therefore, a tape cannot become a random access device practically.

[0009] With such random access engine performance, distributed record of impossible AV data became possible with the optical disk on the conventional tape.

[0010] Drawing 1 is the block diagram of the drive equipment of a DVD recorder. As for the encoder section and 16, the optical pickup from which 11 in drawing reads disc data, the switch whose 12 the ECC (error correcting code) processing section and 13 change a track buffer, and, as for 14, changes the I/O to a track buffer, and 15 are [the decoder section and 17] the enlarged drawings of a disk.

[0011] As shown in 17, data are recorded on a DVD-RAM disk by making 1 sector =2KB into a smallest unit. Moreover, error correction processing is performed in the ECC processing section 12 as a 16 sector =1ECC block.

[0012] The track buffer shown in 13 is a buffer for recording AV data with a Variable Bit Rate in order to record AV data on a DVD-RAM disk more efficiently.

Since a bit rate (inside Vb of drawing) changes according to the complexity in which those contents (if it is video image) have AV data to the R/W rate (inside Va of drawing) to DVD-RAM being a fixed rate, it is a buffer for absorbing the difference of this bit rate. For example, the need is lost when AV data are made into a fixed bit rate like a video CD.

[0013] If this track buffer 13 is used further effectively, it will become possible to carry out discrete arrangement of the AV data on a disk. It explains using drawing 2 .

[0014] Drawing 2 (a) is drawing showing the address space on a disk. As shown in drawing 2 (a), when AV data are divided and recorded on the continuation field of [a1, a2], and the continuation field of [a3, a4], while seeking from a2 to a3, continuation playback of AV data is attained by supplying the data stored in the track buffer to the decoder section. Drawing 2 (b) shows the condition at this time.

[0015] The input from time of day t1 to a track buffer and the output from a track buffer are started, and, as for AV data which started read-out from a1, data are stored only for the part of the rate difference (Va-Vb) of the input rate (Va) to a track buffer, and the output rate (Vb) from a track buffer to the track buffer. This condition continues to a2 (time of day t2). What is necessary is to consume B (t2) accumulated in the track buffer, and just to continue supplying a decoder

before the time of day t3 which reads a3 and can be started, if the amount of data accumulated in the track buffer in the meantime is set to B (t2).

[0016] Even when the amount of data ([a1, a2]) which will be read before seeking if a way of speaking is changed was secured more than the constant rate and seeking occurs, continuation supply of AV data is possible.

[0017] In addition, although data are read from DVD-RAM, namely, this example explained the example in playback, the case of the writing of the data to DVD-RAM, i.e., an image transcription, can be considered the same way.

[0018] Even if the data more than a constant rate will carry out distributed record of the AV data on a disk with DVD-RAM if even continuation record is carried out as mentioned above, continuation playback / image transcription is possible.

[0019] (Explanation of MPEG) Next, AV data are explained.

[0020] Although stated also in advance, AV data recorded on DVD-RAM use the International Standard called MPEG (ISO/IEC13818).

[0021] Even if it is DVD-RAM which has several GB of large capacity, it cannot be said that it has sufficient capacity to record incompressible digital AV data as it is. Then, the approach of compressing and recording AV data is needed. As a compression method of AV data, MPEG (ISO/IEC13818) has spread through a world widely. By the advance of LSI technology in recent years, the MPEG codec (expanding / compression LSI) has put in practical use. MPEG expanding

/ compression by the DVD recorder have been attained by this.

[0022] MPEG mainly has the following two descriptions, in order to realize an efficient data compression.

[0023] Blindness in one eye is having taken in the compression method using an inter-frame time amount correlation property besides the compression method using the spatial frequency characteristics currently performed from the former in compression of dynamic-image data. According to MPEG, each frame (in MPEG, it is also called a picture) is classified into three kinds, I picture (coding picture in a frame), P picture (picture which used the reference relation from coding in a frame, and the past), and B picture (picture which used the reference relation from coding in a frame, the past, and the future), and a data compression is performed by it.

[0024] Drawing 3 is drawing showing the relation of I, P, and B picture. As shown in drawing 3 , refer to nearest I of the past and the future, or the P picture for B picture with reference to I among the past with nearest P picture, or P picture, respectively. Moreover, as shown in drawing 3 , in order that B picture may refer to I of the future, or P picture, the phenomenon in which the order of a display of each picture (display order) and the sequence (cordingorder) in the compressed data are not in agreement arises.

[0025] The second description of MPEG is the points that the dynamic amount

assignment of signs according to the complexity of an image can be performed per picture. It is the decoder of MPEG being equipped with an input buffer and storing data in this decoder buffer beforehand, and it is possible to assign a lot of amounts of signs to a difficult compressive complicated image.

[0026] The audio data used with DVD-RAM can be used choosing them from three kinds, the MPEG audio and DORUBI digital (AC-3) which perform a data compression, and incompressible LPCM. Although DORUBI digital and LPCM are bit rate immobilization, and an MPEG audio is not so large as a video stream, it can choose from some kinds of sizes per audio frame.

[0027] Such AV data are multiplexed by one stream by the method called an MPEG system. Drawing 4 is drawing showing the MPEG structure of a system. As for a pack header and 42, 41 is [a packet header and 43] payloads. The MPEG system has the layered structure called a pack and a packet. A packet consists of a packet header 42 and a payload 43. AV data are divided for every size respectively suitable from a head, and are stored in a payload 43. As information on AV data stored in the payload 43, a packet header 42 It stores. A certain data The decoding time of day DTS (Decoding Time Stamp) and display time of day PTS () of the data contained in the payload written in ID (stream ID) for identifying, and the precision of 90kHz [Presentation] Time Stamp (DTS is omitted when decoding and a display are performed to coincidence like audio

data) is recorded. A pack is the unit which adjusted two or more packets. Since in the case of DVD-RAM uses it as one pack for every packet, a pack consists of a pack header 41 and a packet (a packet header 42 and payload 43). SCR (System Clock Reference) which wrote the time of day when the data in this pack are inputted into a decoder buffer in the precision of 27MHz is recorded on a pack header.

[0028] With DVD-RAM, one pack is recorded for such an MPEG system stream as 1 sector (=2048B).

[0029] Next, the decoder which decodes the MPEG system stream mentioned above is explained. Drawing 5 is the decoder model (P-STD) of an MPEG system decoder. STC from which 51 becomes the standard time of day in a decoder (System Time Clock), The demultiplexer to which 52 solves decoding of a system stream, i.e., multiplexing, I in which the input buffer of a video decoder mentioned 53 above, and a video decoder and 55 mentioned 54 above, In order to absorb the difference between the order of data produced between P picture and B picture, and the order of a display I, As for the reorder buffer which stores P picture temporarily, I which 56 has in a reorder buffer, the switch which adjusts the order of an output of P picture and B picture, and 57, the input buffer of an audio decoder and 58 are audio decoders.

[0030] Such an MPEG system decoder processes as follows the MPEG system

stream mentioned above. When SCR described by the time of day and the pack header of STC51 is in agreement, a demultiplexer 52 inputs the pack concerned. A demultiplexer 52 decodes the stream ID in a packet header, and transmits the data of a payload to the decoder buffer for each stream of every. Moreover, PTS and DTS in a packet header are taken out. The video decoder 54 takes out picture data from a video buffer 53 at the time of day of STC51, and the time of day whose DTS corresponded, performs decoding, stores I and P picture in the reorder buffer 55, and carries out the display output of the B picture as it is. When the pictures which the video decoder 54 has decoded are I and a P picture, a switch 56 is leaned to the reorder buffer 55 side, outputs before [in the reorder buffer 55 / I] or P picture, and, in the case of B picture, leans it to the video decoder 54 side. The audio decoder 58 takes out and decodes the data for 1 audio frame from the audio buffer 57 like the video decoder 54 at the time of day of STC51, and the time of day whose PTS (there is no DTS in the case of an audio) corresponded.

[0031] Next, the multiplexing approach of an MPEG system stream is explained using drawing 6 . In a video frame and drawing 6 (b), a video buffer and drawing 6 (c) show an MPEG system stream, and drawing 6 (d) shows [drawing 6 (a)] audio data, respectively. The axis of abscissa shows the time-axis common to each drawing, and each drawing is drawn on the same time-axis. Moreover, in

the condition of a video buffer, an axis of ordinate shows a buffer occupation (the amount of data accumulation of a video buffer), and the thick wire in drawing shows time transition of a buffer occupation. Moreover, the inclination of a thick wire is equivalent to the bit rate of video, and it is shown that data are inputted into the buffer at the fixed rate. Moreover, that the buffer occupation is reduced at fixed spacing shows that data were decoded. Moreover, the intersection of a slanting dotted line and a time-axis shows the data transfer start time to the video buffer of a video frame.

[0032] Henceforth, the complicated image A in a video data is explained to an example. Since Image A needs a lot of amounts of signs as drawing 6 (b) shows, the data transfer from the time of day t1 in drawing to a video buffer must be started rather than the decoding time of day of Image A. (The time amount from the data input start time t1 to decoding is called vbv_delay) Consequently, it multiplexes in the location (time of day) of the video pack with which it added shading as AV data. On the other hand, since it is not necessary to bring forward more specially than decoding time of day the audio data transfer which does not need the dynamic amount control of signs like video, it is common that a few is multiplexed [of decoding time of day] in front. Therefore, multiplexing is performed in the condition that the video data precedes by the video data and audio data which are reproduced at the same time of day. In addition, by MPEG,

the time amount which can store data into a buffer is limited, and after all the data except still picture data are inputted into a buffer, it is specified must be outputted to a decoder from a buffer within 1 second. Therefore, the gap by multiplexing of a video data and audio data is 1 second (if it says strictly, only the part of the reorder of a video data may shift further) at the maximum.

[0033] In addition, although [this example] video precedes to an audio, on reason, an audio is able to precede to video. When an easy image with high compressibility is prepared for a video data and audio data are transmitted early superfluously, it is possible to make such data intentionally. However, it is that it can precede by constraint of MPEG at the maximum till 1 second.

[0034] (Explanation of a digital still camera) A digital still camera is explained below.

[0035] In recent years, the digital still camera using JPEG (ISO/IEC 10918-1) has spread. The background through which the digital still camera has spread has the spread of violent PCs. The static image which could copy easily [PC] the image photoed with the digital still camera through semiconductor memory, a floppy disk, infrared ray communication, etc., and was copied to PC can be used as presentation software, word-processing software, and Internet contents.

[0036] The digital still camera which voice can incorporate recently further has appeared. Compared with the conventional film type still camera, the further

differentiation was attained by audio sound recording having been attained.

[0037] drawing 7 shows the directory on the JPEG data recorded with the digital still camera, and PC, and the relation of a file -- it comes out.

[0038] As drawing 7 shows, JPEG data are recorded as one file (extension "JPG"), respectively. Moreover, if the number of files becomes more than fixed numbers, since it will be hard coming to manage a user, it is common to give directory structure like drawing 7 , and to divide and record a directory about [every] 100.

[0039] However, the number of sheets of a still picture recordable with a digital still camera is restricted to the storage capacity of the flash memory which is a record medium, or a floppy disk, and can never record a lot of static images. For example, if 50KB of still picture is recorded on 100MB of flash memory, it will become the count which can record only the static image of about 2000 sheets at once.

[0040] (Explanation of a digital video tape recorder) Spread explains a digital video tape recorder, especially remarkable DVC below recently.

[0041] The appearance of DVC made realizable the new function which was not in the conventional VTR. One of them is the record in which the animation and the still picture were intermingled.

[0042] Drawing 8 is drawing showing signs that the animation and the still picture

were recorded by DVC.

[0043] As shown in drawing 8 , in DVC, mixture of an animation and a still picture is possible in order of the record on a tape, and it is possible to record the still picture which continued like the album in recording an animation and a still picture by turns.

[0044] However, since it is tape media and the random access engine performance cannot have management information like a computer deficiently, DVC has the fault which is not easy to reproduce the still picture of arbitration freely.

[0045] The appearance of DVD-RAM solves the problem of the record number of sheets restricted with the digital still camera, and the random access performance issue in DVC, and means possibility of a noncommercial new AV equipment that the still picture of tens of thousands of sheets can be treated freely.

[0046]

[Problem(s) to be Solved by the Invention] This invention solves the following technical problems which serve as trouble when pulling out the engine performance of DVD-RAM expected as a next-generation AV archive medium explained in the above-mentioned conventional technique to the maximum extent, and realizes the DVD recorder which are the max of rewritable mass

optical disk DVD-RAM, and a favorite's application.

[0047] The biggest technical problem in the case of treating a lot of still picture data by the DVD recorder is that management information becomes huge.

[0048] The management information of still picture data is explained using drawing 9 .

[0049] In order to perform free access to the still picture data recorded on the disk, information, such as the address of an access place and size of the data to access, is needed as a matter of course.

[0050] Furthermore, like a digital still camera, when voice data is attached, even the playback time amount of voice data is needed besides the address and size. Furthermore, when realizing postrecording, the voice data management information for postrecording is needed.

[0051] In order to access a sector unit (one sector =2048B) to 4.7GB of data area, 2B is required for 1B and voice to still pictures as 4B and data size as the address, and when it is voice data, 2B is further needed as playback time amount. Moreover, to realize audio postrecording, the management information for voice is [2 double] necessary, it is total, and the management information field of 21B is required.

[0052] They are 65000 sheets, if the management information of 21B is used for every still picture of one sheet when the static image of 65000 sheets is recorded.

x 21B = It is set to 1365000B, and it is total and about 1.4MB of management information is needed.

[0053] Although 1.4MB of amount of data is slight if it is measured from the storage capacity of DVD, considering random access, it is data which it should always have on the memory which the system control section (CPU as used in the field of PC) has. Although the price of memory has fallen sharply in recent years, it is difficult to carry the memory of a megabyte unit as a noncommercial AV equipment, and considering the battery back-up of the memory supposing an emergency, it is unreal as a noncommercial AV equipment to deal with the management information of a megabyte.

[0054]

[Means for Solving the Problem] Invention which relates to claim 1 in order to solve the above-mentioned technical problem is the optical disk with which still picture data were recorded at least, and is taken as the optical disk characterized by having the still picture management information table (Video_Table) of the variable-length size proportional to the still picture number of sheets managed by the quiescence book-of-paintings management information (VOBSI) which manages the still picture data of two or more sheets as one quiescence book of paintings, and said quiescence book-of-paintings management information (VOBSI).

[0055] Invention concerning claim 2 is an optical disk according to claim 1, and when the voice reproduced synchronizing with said still picture is recorded, it is taken as the optical disk characterized by having the voice management information table (Audio_Table) of the variable-length size proportional to the number of voice by which synchronous playback is carried out in the still picture in said quiescence book of paintings.

[0056] Invention concerning claim 3 is an optical disk claim 1 thru/or given in two, and said still picture management information table (Video_Table) has still picture management information (VideoI), and is using it as the optical disk characterized by having the pointer information (Ptr_to_AudioI) to still picture data size and the voice management information (AudioI) by which synchronous playback is carried out with the still picture concerned at said still picture management information (VideoI).

[0057] Invention concerning claim 4 is an optical disk claim 1 thru/or given in three, and said voice management information table (Audio_Table) has voice management information (AudioI), and is using it as the optical disk characterized by having the address of voice data, voice data size, voice playback time amount, and the pointer information (Ptr_to_AudioI) that stretches the link to other voice management information (AudioI) at the time of postrecording use at said voice management information (AudioI).

[0058] Invention concerning claim 5 is an optical disk claim 1 thru/or given in four, and is taken as the optical disk characterized by having the playback discernment flag (Playback_permission) which shows the existence of the display at the time of playback for every still picture in said quiescence book of paintings in said still picture management information (VideoI).

[0059] Invention concerning claim 6 is an optical disk recorder which records still picture data on an optical disk claim 1 thru/or given in five at least, creates the still picture management information (VideoI) which manages said still picture at the time of still picture record, and is taken as the optical disk recorder characterized by carrying out additional record at said still picture management information table (Video_Table) of the variable-length size proportional to the still picture number of sheets in said quiescence book of paintings.

[0060] Invention concerning claim 7 is an optical disk recorder according to claim 6. When the voice by which synchronous playback is carried out is recorded to said still picture, the voice management information (AudioI) which manages said voice data is created. Additional record is carried out at said voice management information table (Audio_Table) of the variable-length size which is proportional to the still picture in said quiescence book of paintings at the number of voice by which synchronous playback is carried out. It is considering as the optical disk recorder characterized by recording the pointer information

(Ptr_to_AudioI) to the voice management information (AudioI) in the still picture management information (VideoI) which manages said still picture as the voice management information (AudioI) concerned.

[0061] Invention concerning claim 8 is claim 6 thru/or an optical disk recorder given in seven. When it postrecords to the still picture which has the voice by which synchronous playback is carried out Create the recorded voice management information (AudioI) for voice, and additional record is carried out at said voice management information table (Audio_Table). It is considering as the optical disk recorder characterized by what is recorded on the pointer information (Ptr_to_AudioI) to other voice management information (AudioI) in the voice management information (AudioI) for said original voice as pointing to the voice management information (AudioI) concerned.

[0062] Invention concerning claim 9 is claim 6 thru/or an optical disk recorder given in eight, and is taken as the optical disk recorder characterized by setting up a playback discernment flag (Playback_Permission) improper to the still picture which is not reproduced within said quiescence book of paintings.

[0063] Invention concerning claim 10 is an optical disk player which plays an optical disk claim 1 thru/or given in five. Still picture playback is performed in order of the still picture management information table (Video_Table) in said quiescence book-of-paintings management information (VOBSI). When effective

value is described by the pointer information (Ptr_to_AudioI) to the voice management information (AudioI) in said still picture management information (VideoI) at the time of still picture playback As long as it searches the voice management information (AudioI) concerned and the link to the voice management information (AuidoI) of further others is stretched, new voice management information (AudioI) is searched. The voice which carries out synchronous playback is determined as said still picture, and it is considering as the optical disk player characterized by performing playback of a still picture and voice.

[0064] Invention concerning claim 11 is an optical disk player according to claim 10, searches the playback discernment flag (Playback_Permission) in the still picture management information (VideoI) which manages the still picture to reproduce, and, in the case of the playback improper condition, makes it the optical disk player characterized by not reproducing said still picture.

[0065]

[Embodiment of the Invention] The detail of this invention is explained using the DVD recorder and DVD-RAM which are one example of this invention.

[0066] (Logical organization on DVD-RAM) The logical organization on DVD-RAM is first explained using drawing 10 . The data configuration on the disk which appears through a file system as for drawing 10 (a), and drawing 10

(b) show the physical sector address on a disk. The standard signal required in order for there to be a lead-in groove field in the head part of a physical sector address and to stabilize a servo, the recognition signal with other media, etc. are recorded. A data area exists following a lead-in groove field. Effective data are logically recorded on this part. Finally there is a lead-out field and the same standard signal as a lead-in groove field etc. is recorded.

[0067] The management information for file systems called volume information is recorded on the head of a data area. Since there are no contents and direct relation of this patent about a file system, it omits.

[0068] It enables the data in a disk to treat as a directory or a file by letting a file system pass, as shown in drawing 10 (a).

[0069] All the data that a DVD recorder treats are put on the bottom of the VIDEO_RT directory directly under a ROOT directory, as shown in drawing 10 (a).

[0070] The file which a DVD recorder treats is roughly distinguished by two kinds, and are one management information file and an AV file of plurality (at least one).

[0071] (Management information file) Next, the contents of the management information file are explained using drawing 11 (a). Here, the management information for animations is mainly explained.

[0072] In a management information file, it roughly divides, and is classified into

a VOBI (VOB information) table and a PGCI (PGC information) table. VOB is the program stream of MPEG and PGC defines the playback sequence of Cell which makes the partial section (or entire interval) of the arbitration in VOB one logic playback unit. In other words, VOB is one unit which has semantics as MPEG, and PGC is one unit in which a player is reproduced.

[0073] a VOBI table -- inside -- a VOBI number (Number_of_VOBIs) and every -- VOBI is recorded and VOBI consists of the VOB identifier (VOB_ID) within corresponding AV file name (AV_File_Name) and a corresponding disk, the start address (VOB_Start_Address) within AV file, an ending address (VOB_End_Address) within AV file, playback time amount length (VOB_Playback_Time) of VOB, and attribute information (VOB_Attribute) on a stream.

[0074] PGCI is recorded. a PGCI table -- inside -- a PGCI number (Number_of_PGCIs) and every -- It consists of CellI(s). PGCI -- the number (Number_of_CellIs) of CellI(s) (Cell information) in PGC, and every -- VOB_ID to which CellI corresponds, the playback start time within VOB (Cell_Start_Time), It consists of playback time amount (Cell_Playback_Time) within VOB, a playback starting address (Cell_Start_Address) within VOB, and a playback ending address (Cell_End_Address) within VOB.

[0075] (AV file) Next, AV file is explained using drawing 11 (b).

[0076] AV file consists of VOB(s) of plurality (at least one), and VOB is continuously recorded within AV file. VOB in AV file is managed for the VOB information on a management information file mentioned above. A player accesses a management information file first, it is reading the starting address and ending address of VOB, and access to VOB is attained. Moreover, Cell is defined as a logical playback unit in VOB. Cell is the partial regeneration section (or entire interval) of VOB, and a user can set it up freely. It is possible to perform simple edit, without operating actual AV data by this Cell. The access information to Cell is managed within the Cell information in a management information file like VOB. A player accesses a management information file first, it is reading the starting address and ending address of Cell, and access to Cell is attained.

[0077] In order that the address information of Cell may make VOB a standard and the address information of VOB may make AV file a standard, in fact, the address information of VOB is added to the address information of Cell, the address information within AV file is calculated, and a player accesses AV file.

[0078] (Management information for still picture data) Next, the management information of still picture data is explained using drawing 12 .

[0079] As for the management information for still pictures, instead of VOBI, VOBSI (VOBS information) is stored in a VOBI table. VOBS is the aggregate of

two or more VOB(s) set to VOB including voice, when there is voice which synchronizes with one still picture and a still picture.

[0080] It consists of a still picture management information table (Video_Table) which stored the management information the VOBS identifier (VOBS_ID) within corresponding AV file name (AV_File_Name) and a corresponding disk, the start address (VOBS_Start_Address) within AV file, the ending address (VOBS_End_Address) within AV file, and for the still picture data in VOBS in VOBSI, and a voice management information table (Audio_Table) which stored the management information for the audio data in VOBS.

[0081] The still picture management information (VideoI) and the number (Number_of_VideoIs) of still picture management information for every one still picture are stored in a still picture management information table (Video_Table), and still picture management information (VideoI) has pointer information (Ptr_to_AudioI) 1B to the voice management information in a voice management information table (Audio_Table) on it as information on size information (Size) 1B of still picture data, and the voice by which coincidence playback is carried out with a still picture.

[0082] On a voice management information table (Audio_Table) The voice management information (AudioI) and the number (Number_of_AudioIs) of voice management information for every voice data are stored. Voice management

information (AudioI) Address information (Address) 4B of voice data, and size information (Size) 2B of voice data, As audio playback hour entry (Playback_Time) 2B and information on postrecording voice at the time of postrecording It has pointer information (Ptr_to_AudioI) 1B to the voice management information (AudioI) which stored the postrecording voice in a voice management information table (Audio_Table).

[0083] Moreover, on the PGCI table which defines a playback sequence, it has information which is different from an animation on CellI level. CellI for quiescence books of paintings consists of an identifier (VOBS_ID) of corresponding VOBS, an initiation VOB number (Cell_Start_Video) within VOBS, and a termination VOB number (Cell_End_Video) within VOBS.

[0084] By this configuration, the playback assignment of the arbitration section (from the still picture of arbitration up to the still picture of arbitration) within VOBS of Cell for quiescence books of paintings is attained.

[0085] Next, the link of a still picture and voice is explained using drawing 13 .

[0086] When still picture management information (VideoI) has the pointer information (Ptr_to_AudioI) to the voice management information (AudioI) in an audio table (Audio_Table) and this field has an invalid value (= 0), it is shown that the voice which the still picture which still picture management information (VideoI) manages synchronizes, and is reproduced does not exist (Video#3 and

Video#4). On the contrary, when pointer information (Ptr_to_AudioI) has effective value, it is shown that the voice reproduced synchronously exists (Video#1 and Video#2).

[0087] Moreover, when new voice data is recorded by postrecording, it has the pointer information (Ptr_to_AudioI) to other voice management information (AudioI) in voice management information (AudioI). The existence of postrecording shows that postrecording voice exists, when the pointer information (Ptr_to_AudioI) in voice management information (AudioI) as well as the pointer information (Ptr_to_AudioI) in the still picture management information (VideoI) mentioned above has effective value (Audio#1->Audio#3).

[0088] Next, the relation between still picture management information (VideoI) and voice management information (AudioI), and the live data in AV file (AV data) is explained.

[0089] The sequence of the still picture management information (VideoI) in a still picture management information table (Video_Table) is in agreement in order of record of the still picture data within AV file. Moreover, the sequence of the voice management information (AudioI) in a voice management information table (Audio_Table) is also in agreement in order of record of the voice data within AV file.

[0090] In VOBS which consists of only still picture data which follow, for example,

do not have voice data, the address within AV file of each still picture is calculable by adding the still picture data size (Size) currently recorded in still picture management information (VideoI) from the VOBS head.

[0091] It is shown that voice data is recorded on the address concerned in the address when voice data is inserted between still pictures (voice 1 and voice 2), after adding still picture data size when it is the same value as compared with the address of voice management information (AudioI), and only the data size of the voice data concerned is added to the address. By repeating this count and performing it, it is possible to access to all the still picture data in VOBS.

[0092] Next, the access approach to a still picture and voice is concretely explained using the flow chart of drawing 14 .

[0093] The variable j which first shows the entry number in the variable i which shows the entry number in the current address Add and a still picture management information table (Video_Table), and a voice management information table (Audio_Table) is initialized.

[0094]

Add = VOB_Start_Addressi = 1j = The 1 (step1) variable j is compared with the number (Number_of_AudioIs) of voice management information, and it is j. <= When filling Number_of_AudioIs, it progresses to step3 which performs the address comparison with voice data, and in the case of others, it progresses to

step5.

[0095] (step2) The address information of the current address Add and audio management information #j is compared, and it is Add. == Since it is shown that the current address Add is a start address of the voice data which voice management information #j (Audio#j) manages when an Audio[j].Address top type is realized, it progresses to step4 adding the current address. When an upper type is not realized, it progresses to step5.

[0096] (step3) Addition of the voice data size of voice management information #j (Audiol#j) and the increment of Variable j are performed to the current address Add, and it returns to step2.

[0097]

Add += Since it means that the current address Add shows a still picture data address when not filling conditional expression with Audio[j].Sizej++(step4) step2 or step3, the address of the still picture concerned is determined.

[0098] (step5) Next, it progresses to step7 which investigates the existence of the pointer to voice management information (Audiol), and searches voice by which synchronous playback is carried out with the still picture concerned when it exists, and when it does not exist, it progresses to reproduced step10.

[0099] (step6) The temporary arrangement of the voice by which synchronous playback is carried out with the still picture concerned is carried out at

Ptr_to_Audiol.

[0100] (step7) When it searches whether the link to the voice management information (Audiol) of further others [management information / (Audiol) / which Ptr_to_Audiol shows / voice] is stretched and the link to other voice management information (Audiol) is stretched, it returns to step7 again.

[0101] (step8) In step8, when it is able to check that the further link to voice management information (Audiol) is not stretched, the voice by which synchronous playback is carried out with the still picture concerned is determined.

[0102] (step9) The voice data determined as the still picture data determined by step5 by step9 is reproduced (only when it exists).

[0103] (step10) Variable i is incremented.

[0104] The number (Number_of_Videols) of still picture management information is compared for the i++ (step11) variable i, and it is i. <= Since it is shown that the still picture data reproduced further exist in a quiescence book of paintings (VOBS) when filling a Number_of_Videols top type, when not filling return and an upper type to step2, playback of a quiescence book of paintings is ended.

[0105] (step12)

(VOBSI data size) Next, the management information size for quiescence books of paintings in this example is explained.

[0106] It will be 65000, even if it photos the still picture of 65000 sheets since the management information to one still picture is 2B of the pointer information to still picture data size and voice as drawing 12 explained. x 2B = It fits in the capacity of 130KB of 130000B abbreviation. This size is about only 10% as compared with 1.4MB shown in the conventional example.

[0107] Moreover, considering the case where voice data is recorded on coincidence, it is unreal in capacity to attach voice data to all the still pictures of 65000 sheets, even if it is DVD-RAM which is a mass archive medium.

[0108] If it is 4.7GB-65000 x 50KB = 1.45GB when the size of one still picture is assumed to be 50KB, and each voice data is assumed to be 192kbps(es) and 10 seconds It turns out that 1.45GB of voice data can be recorded only up to 6000 /192kbps x 10sec = 6041 abbreviation. Since the management information for voice data is 9B need, respectively, it sets to 6000 x 9B = 54000B and is total, and it turns out that 184KB and about 13% of the conventional example are sufficient.

[0109] In addition, in addition to size information (Size) 1B of the still picture data shown in drawing 12 , and pointer information (Ptr_to_AudioI) 1B to voice management information, you may have address information (Address) 4B of still picture data in the still picture management information (VideoI) for every one still picture as a modification of the management method explained using

drawing 12 thru/or drawing 14 . Although the data size of the management information per still picture increases to 6B rather than the approach mentioned above by this, access to still picture data becomes easy. When there is no voice reproduced synchronizing with a still picture at this time, compared with the data size (per still picture 21B) of the management information of the conventional example shown in drawing 9 , it can do small to about 29% (= 6/21).

[0110] (Block diagram of a DVD recorder) Drawing 15 is the block diagram of a DVD recorder.

[0111] The user interface section in which 1501 receive a display and the demand from a user to a user among drawing, The system control section in which 1502 manages whole management and control, the input section by which 1503 is constituted from a camera and a microphone, The encoder section by which 1504 is constituted from a video encoder, an audio encoder, and a system encoder, As for the output section by which 1505 is constituted from a monitor and a loudspeaker, the decoder section by which 1506 is constituted from a system decoder, an audio decoder, and a video decoder, and 1507, a track buffer and 1508 are drives.

[0112] First, the record actuation in a DVD recorder is explained using drawing 15 .

[0113] The user interface section 1501 receives the demand from a user first.

The user interface section 1501 tells the demand from a user to the system control section 1502, and the system control section 1502 performs a processing demand for the demand from a user to an interpretation and each module. When the demand from a user is photography and sound recording of a static image, the system control section 1502 requires encoding of one video frame, and audio encoding of the encoder section 1504.

[0114] The encoder section 1504 encodes [video-] and encodes [system-] only one sheet, and sends the video frame sent from the input section 1503 to a track buffer 1507.

[0115] Next, it tells that creation of static-image data ended the encoder section 1504 in the system control section 1502, and the system control section 1502 records the static-image data stored in the track buffer 1507 through the drive 1508 on a DVD-RAM disk.

[0116] After encoding termination of video, the encoder section 1504 starts audio encoding of the voice data immediately sent from the input section 1503, and carries out the sequential transfer of the generated audio data at a track buffer 1507.

[0117] Moreover, it tells that the encoder section 1504 started audio encoding to the system control section 1502, and the system control section 1502 records serially the audio data stored in the track buffer 1507 through the drive 1508 on a

DVD-RAM disk.

[0118] The stop demand from a user is told to the system control section 1502 through the user interface section 1501, delivery and the encoder section 1504 end encoding for sound recording stop instruction by encoding to the audio frame just behind that in the encoder section 1504, and the system control section 1502 tells encoding processing termination to the system control section 1502 after transmitting all audio data to a track buffer 1507. The system control section 1502 records the audio data of all the remainder stored in the track buffer 1507 through the drive 1508 on a DVD-RAM disk.

[0119] After the above termination of operation, the system control section 1502 creates VOBSI and CellI which were mentioned above, and records on a DVD-RAM disk through drive 1508. At this time, it is important to generate so that the voice management information (AudioI) of voice data which recorded the link information (Ptr_to_AudioI) to the voice management information (AudioI) in still picture management information (VideoI) to coincidence may be pointed out.

[0120] One VOBS is formed because a user performs continuously record of the still picture and voice which were mentioned above. While VOBS is one unit on DS, it is also the lump of the still picture which the user photoed continuously at once.

[0121] Next, the playback actuation in a DVD recorder is explained using drawing 15 .

[0122] The user interface section 1501 receives the demand from a user first. The user interface section 1501 tells the demand from a user to the system control section 1502, and the system control section 1502 performs the interpretation of the demand from a user, and a processing demand to each module. When the demand from a user is playback of PGC which points out a quiescence book of paintings (VOBS), the system control section 1502 reads the VOBS information (VOBSI) which corresponds from VOBS_ID described by the Cell information (CellI) on PGCI which read and read PGC information (PGCI) through the drive 1508.

[0123] Next, the system control section 1502 makes the address of the still picture data to reproduce, the existence of the voice data by which synchronous playback is carried out, and the decision of the voice data concerned according to the flow chart explained by drawing 14 .

[0124] Next, the system control section 1502 requires read-out from a DVD-RAM disk, and storing in a track buffer 1507 of drive 1508 in order of still picture data and voice data (when it exists).

[0125] Next, the system control section 1502 advances a decoding demand to the decoder section 1506, and the decoder section 1506 reads AV data from a

track buffer 1507, and performs decoding. It is decoded and, as for data, the display to a monitor and the output from a loudspeaker are performed through the output section 1505.

[0126] In addition, in this example, although DVD-RAM was explained to the example, the same thing can be said also in other media and this invention is restricted only to neither DVD-RAM nor an optical disk.

[0127] Moreover, although VOB for static-image data and VOB for audio data were divided with other VOB(s) and recorded on AV file in this example, you may record in same AV file as other VOB(s), and this invention does not receive a limit in the configuration of AV file.

[0128] Moreover, although sequence of the voice management information (Auidol) in a voice management information table (Audio_Table) was made equal in order of data logging in AV file in this example, it essentially is not limited. However, when the entry sequence of voice management information (Audiol) and the order of record in AV file are not in agreement, it becomes impossible for the candidate for retrieval of the voice management information (Audiol) at the time of still picture address detection to limit to one, and retrieval of whole tone voice management information (Audiol) is needed.

[0129] Moreover, although [this example] all the still pictures and whole tone voice data which are managed by VOBSI are solidified and recorded in

VOBS_End_Address from VOBS_Start_Address in AV file Voice data, especially the voice data which recorded the postrecorded result It does not need to be limited to this limit, and unless it is contained in the record section which other VOBS(s) manage (from VOBS_Start_Address to VOBS_End_Address), a problem is not produced even if recorded on which location in AV file.

[0130] Moreover, as shown in drawing 16 , it becomes possible to specify the still picture which reproduces namely, skips the playback discernment flag (Playback_Permission) which shows effective/invalid at the time of playback of still picture data by preparing 1 bit into still picture management information (VideoI) at the time of playback, and it becomes possible easily to reproduce only a favorite still picture out of the still picture photoed in large quantities.

[0131] Moreover, in drawing 12 , although allowances were seen and the address was expressed with 4B, since all the sector addresses in a disk can be expressed if the number of sectors (2048B) is a maximum of 2,464,153 pieces (=4.7x1024x1024x1024/2048) and there are at least 22 bits to 4.7GB of disk, the address may be expressed with 3B.

[0132]

[Effect of the Invention] The quiescence book-of-paintings management information which is the optical disk with which still picture data were recorded at least in this invention, and manages the still picture data of two or more sheets

as one quiescence book of paintings (VOBSI), It has the still picture management information table (Video_Table) of the variable-length size proportional to the still picture number of sheets managed by said quiescence book-of-paintings management information (VOBSI). Moreover, when the voice reproduced synchronizing with said still picture is recorded, It has the voice management information table (Audio_Table) of the variable-length size proportional to the number of voice by which synchronous playback is carried out in the still picture in said quiescence book of paintings. Said still picture management information table (Video_Table) It has still picture management information (VideoI), and has the pointer information (Ptr_to_AudioI) to still picture data size and the voice management information (AudioI) by which synchronous playback is carried out with the still picture concerned in said still picture management information (VideoI).

[0133] Consequently, compression is possible for a still picture and the data size which needs audio management information, and the effectiveness it is ineffective to it being possible to stop to a little more than ten percent compared with the conventional configuration is acquired.

[0134] Moreover, said voice management information table (Audio_Table) has voice management information (AudioI), and it is having the address of voice data, voice data size, voice playback time amount, and the pointer information

(Ptr_to_Audiol) that stretches the link to other voice management information (Audiol) at the time of postrecording use, and the effectiveness it is ineffective to postrecording easily being possible is acquired by said voice management information (Audiol), without losing original voice management information.

[0135] Moreover, the effectiveness that a setup of skipping an unnecessary still picture and reproducing for every still picture in said quiescence book of paintings by having the playback discernment flag (Playback_permission) which shows the existence of the display at the time of playback in said still picture management information (Videol) is attained easily is acquired.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The drive equipment block diagram of a DVD recorder.

[Drawing 2] (a) Drawing showing the address space on a disk.

(b) Drawing showing the amount of data accumulation in a track buffer.

[Drawing 3] The picture correlation diagram in an MPEG video stream.

[Drawing 4] The block diagram of an MPEG system stream.

[Drawing 5] The block diagram of an MPEG system decoder (P-STD).

[Drawing 6] (a) Drawing showing a video data.

(b) Drawing showing a video buffer.

(c) Drawing showing an MPEG system stream.

(d) Drawing showing audio data.

[Drawing 7] Drawing showing the still picture management method in a digital still camera.

[Drawing 8] Drawing showing the record condition of the animation in a digital video tape recorder, and a still picture.

[Drawing 9] Drawing showing the configuration of the management information for still pictures.

[Drawing 10] (a) Drawing showing directory structure.

(b) Drawing showing the physical arrangement on a disk.

[Drawing 11] (a) Drawing showing management information data.

(b) Drawing showing stream data.

[Drawing 12] Drawing showing the configuration of the management information

for quiescence books of paintings.

[Drawing 13] Drawing showing the link relation between a still picture and voice.

[Drawing 14] Drawing showing the flow which asks for the address of still picture data, and the existence of voice data.

[Drawing 15] The block diagram of a DVD recorder.

[Drawing 16] Drawing showing a still picture effective flag.

[Description of Notations]

11 optical pickups, 12ECC processing section, 13 track buffers, 14 switches, 15 encoder sections, 16 decoder sections, 41 pack header, 42 packet headers, 43 payloads, 51STC, 52 demultiplexers, 53 video buffers, 54 video decoder, 55 reorder buffer, 56 switches, 57 audio buffer, 58 audio decoder, the 1501 user interface sections, the 1502 system control sections, the 1503 input sections, the 1504 encoder sections, the 1505 output sections, the 1506 decoder sections, 1507 track buffers, 1508 drives.